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EXPOSURE INFORMATION REPORT

PROTECO
PENUELAS, PUERTO RICO
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Prepared for:

PROTECO
Penuelas, Puerto Rico

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1.0 INTRODUCTION

The purpose of this Exposure Information Report (EIR) is to provide the Administrator of the United States Environmental Protection Agency (USEPA) with the exposure information required pursuant to Section 3019 of the Resource Conservation and Recovery Act (RCRA), as amended in 1984. The exposure information contained herein is submitted so that a final permit determination can be made regarding proposed units of Proteccion Tecnica Ecologica, Inc. (PROTECO facility) near Penuelas, Puerto Rico (USEPA I.D. No. PRD091018622).

This EIR has been prepared in conformance with the July 3, 1985 EPA document entitled: Permit Applicants' Guidance Manual for Exposure Information Under RCRA Section 3019.

Based upon the statutory language of Section 3019, the scope of the EIR is limited to:

- o Reasonably available information;
- o Releases related to landfills and surface impoundments identified in the Part B Permit Application;
- o Releases which occur during the active life of the facility up to closure; and
- o The assumption that the facility is operating in full compliance with its permit.

The primary source of information for the EIR is the revised RCRA Part B Permit Application (submitted February 19, 1986). Other sources of information include engineering, geological, and other reports prepared for both Federal and Commonwealth agencies (see References).

The PROTECO site occupies approximately 35 acres (0.14 km^2) in a small valley with high topographical relief at an elevation ranging between 260 and 400 feet above sea level. The facility is located about 4.3 miles (7 km) southeast of the city of Penuelas, Puerto Rico, 2 miles (3.2 km) north of Tallaboa Bay in the Caribbean, and 1.5 miles (2.4 km) east of the lower Tallaboa River valley. The only surface runoff leaves the site in a small drainage ditch, which parallels the entrance road, that travels toward the lower Tallaboa River Valley. Such runoff only occurs during extraordinary rainfall events, due to the high evapotranspiration rates. The ditch never actually joins the Tallaboa River but enters the Tallaboa Bay less than 1 mile (1.6 km) east of the River.

2.0 INFORMATION REQUIREMENTS

This section contains information about the PROTECO site that is needed to prepare an Exposure Information Report (EIR). Annex A is a checklist which references the relevant exposure information contained in the revised Part B Permit Application (Feb 16, 1986) and other sources.

2.1 General Information

Two broad assessments of the existing PROTECO facility have been done since 1981:

- (a) Environmental Impact Statement (Servicios Carbareon, Inc. 1981) (See Annex B of the EIR for the existing units, submitted August 1985); and
- (b) Hydrogeologic Conditions at the Carbareon Waste Disposal Site (August 1983).

Insurance Claims. Since the implementation of RCRA, no insurance claims or settlements have been made relating to the operation of the existing regulated landfill and surface impoundment units.

Zoning. A landuse map has been developed and is included as Annex B of this report. The land immediately surrounding the site is primarily unused due to its remote location and steep terrain. The scant rainfall and rugged calcareous geological setting has generally precluded agricultural activity in the region although there are some agricultural operations in the vicinity of the site. There are no man-made structures within 1 km of the site in any direction except for electric power transmission lines which cross the north end of Parcel B. There are also no permanent residences for over 2.3 kilometers in any direction. Because of the rugged and inhospitable terrain, there are no plans for land development near the site.

Land within 1 mile (1.6 km) of the site is covered primarily with shrubs and undergrowth and secondarily with medium size trees; there is some poor quality pasture land in addition. East of the site, the only current land use

within three miles (5 km) of the site (in western Ponce municipality), is primarily for grazing. Two miles (3.2 km) to the south of the site lies the Caribbean Sea. Two miles (3.2 km) to the southwest lies the heavily industrialized lower Tallaboa River Valley. Up to 4 miles (7 km) to the west and north of the site is some subsistence agriculture, some grazing, and more shrubs and undergrowth (P. Vazquez, Economic Planner with Municipio de Ponce, telephone communication).

Aerial Photograph. An aerial photograph of the facility is given in the EIR for the existing units submitted August 1985.

Waste Analysis. Information on wastes planned for acceptance at the proposed PROTECO facility is presented in the revised Part A Permit Application (submitted April 1986) and in Section H.1 of the revised Part B Permit Application. The waste streams projected for acceptance at the new facility are listed in the Part A Permit Application. The chemical and physical nature of the hazardous wastes proposed for treatment, storage, or disposal are given in Section C of the Part B Permit Application. In addition, Section C presents the proposed waste characterization program, and documentation of waste acceptance, receipt, and disposal.

Waste Quantity. Broad categories of wastes and the quantities expected to be handled annually at the proposed units are estimated below:

| <u>Waste Classification</u> | <u>Estimated Annual Quantity (Kilograms)</u> |
|--|--|
| Ignitable | 230,000 |
| Corrosive | 2,000,000 |
| EP Toxic - Metals | 1,090,000 |
| EP Toxic - Pesticides | 290,000 |
| Non-Specific Source Waste | 225,000 |
| Specific Source Waste | 4,000 |
| Acutely Hazardous Commercial Chemical Products | 100 |
| Other Commercial Chemical Products | 52,000 |

Inspection Reports. Two EPA inspections for the existing units have been conducted at the PROTECO facility since 1984. A RCRA sampling inspection was done on March 21-22, 1984. Its purpose was to determine site conditions and obtain soil and groundwater data. Soil samples were obtained from these

existing units: drum storage area (#4), lindane storage tank, and landfarm. Water samples were taken from the upgradient and downgradient wells and the rainwater lagoon. Liquid was also sampled from the oil lagoon.

The RCRA monitoring wells were stated to be "relatively free of organics contamination" in the Inspection Report (dated October 11, 1984). Soil samples from the drum storage area had 18 ppm of bis (2-ethylhexyl) phthalate and up to 0.1 ppm of four other compounds. Soil from the land farm had 17 organic contaminants; their concentrations range from 1 ppm to 230 ppm. These contaminants and their concentrations are listed in Annex C of the EIR for the existing units (submitted August 1985).

EPA conducted another inspection from November 14-23, 1985. The results of this inspection are presented in Annex C. PROTECO has taken a series of actions to bring its operation into compliance with EPA and EQB regulations; these actions are summarized in Annex D.

2.2 Pathway-Specific Information

This section contains exposure information for the following environmental pathways: groundwater, surface water, air, subsurface gas, and soil.

2.2.1 Ground Water

Based on historical information presented in Rickher et al. (1970) and Grossman et al. (1972), there were industrial and irrigation wells in the lower Tallaboa River Valley in the late 1960's. In recent years, however, the lower portion of the Tallaboa aquifer was damaged by overpumping, salt water intrusion, and petroleum spillage from industry in the lower Tallaboa River Valley (Ressy 1985). Ressy (1985) states that there are no drinking water wells in the lower Tallaboa valley within 3 miles (4.8 km) of the PROTECO site. All communities in this area are served by an aqueduct, and all industries get their water from the upper Tallaboa or from the Yauco-Borinas Valley.

Aquifer Description. The hydrogeology of the region around the site has been investigated for nearly 30 years (Grossman et al., 1972). Data have been collected on site since 1980 in a series of investigations which continue at present.

The major conclusions presented below on the geologic materials and hydrogeologic conditions in the vicinity of the site are based on Ressay (1983) and more recent site investigations:

- o The proposed units at the facility are underlain by clastic sedimentary geologic material of the Juan Diaz Formation. Some of the ridges at the site consists of Ponce Limestone, which has no significant effect on groundwater flow beneath the facility.
- o The Juana Diaz Formation, in general, consists of lenticular and intertonguing beds of conglomerate, sandstone, mudstone, limestone, and chalk. Regionally, the Juana Diaz Formation strikes generally east to west and dips gently about 10° to 28° south (Grossman, 1962). Geologic investigations at outcrops on the site with a Brunton compass indicate a strike of N40°W and N59°W dipping 31° and 23° southwest, respectively. These measurements are within the variable range found in the Juana Diaz Formation as mapped by Krushensky and Monroe (1978).
- o Numerous borings taken at the facility indicate that the Juana Diaz Formation exists in three major units at the facility:
 - 0 to 12-95 feet: Dense, semi-indurated calcareous clay, buff to brown. Gypsum lenses that range from 0.25 to 2 cm thick occur sporadically. Some coral lenses and thin lenses of silty limestone (5 cm thick) occur at a few locations. Permeability (undisturbed sample lab analysis) was measured at 9.53×10^{-9} cm/s.

- 12-95 to 200+ feet: Very dense silty clay or mudstone, dark gray, well compacted. Gypsum lenses (0.5-2.0 cm thick) occur sporadically. Very small crushed to broken shell fragments occur in zones. Permeabilities (undisturbed sample lab analyses) ranged from 2.51×10^{-6} to 9.02×10^{-8} cm/s. In some areas of the facility, gray silty clay was not encountered at these depths.
- 10-200 to 400 feet: Very hard, massive, fossiliferous limestone, orange to gray, contains lenses of calcite. In some zones the rock is exceptionally hard, more competent and less weathered, possibly reef deposits.

Ground Water Occurrence. Ground water has been documented as occurring in zones 2 to 6 inches thick consisting of gypsum crystals in a wet clay matrix. The water is saline and highly mineralized. Previously, it was theorized that the water was connate in origin (i.e., originally seawater trapped while the formation was being deposited). However, HART believes that the water is meteoric. It appears that very small quantities of water infiltrate the ground due to the relatively impermeable soil, high evapotranspiration rate, and high relief. The water that does filter into the subsurface appears to move very slowly, contributing to its high salinity and mineralization. The Juana Diaz Formation is not used as a source of drinking water in the area.

Water-bearing zones (2-6 inches thick) or microfractures exist in both the brown and gray clays at 30-135 feet. Additionally, two borings which appeared dry during drilling were found to contain water after several hours. Wells constructed in these zones, however, ran dry after bailing fewer than three (3) well volumes. At several locations around the facility, deep borings have been made in which no water was encountered. Furthermore, water-bearing zones have not been observed in the limestone bedrock.

The groundwater that does exist in the vicinity of the facility appears to be semi-confined. Potentiometric contour maps generated from existing well data support the theory that the water-bearing zones are discontinuous and possibly have little or no impact on one another.

Ground Water Recharge and Discharge Zones. The Ground Water Section of the Puerto Rico Environmental Quality Board was contacted in an attempt to locate published maps showing regional groundwater recharge zones in the site area. Personnel familiar with publications on the groundwater resources of the site area stated that no such maps exist.

Ground water is probably not significantly recharged in the vicinity of the site because of:

- 1) Low infiltration rates due to impermeable surface clays;
- 2) Low infiltration rates due to the high relief; and
- 3) High evapotranspiration rates.

Net Precipitation. Based on annual evaporation and rainfall data for four localities in Puerto Rico, Ressay (1983) suggests that evapotranspiration is the dominant hydrological factor at the site. With an annual rainfall between 35 and 40 inches, there is a substantial negative net precipitation (predicted to be about -30 to -40 inches).

2.2.2 Surface Water

The only surface water bodies near the site are the Tallaboa River, which is over 1.5 miles (2.4 km) to the west, and the Tallaboa Bay about 2 miles (3.2 km) to the south. The Tallaboa River and Bay apparently receive no actual drainage from the site, although there is a drainage ditch leaving the site which has no regular flow. The drainage ditch parallels the entrance road and can be traced to the point where it enters the bay less than 1 mile (1.6 km) east of the River.

Drainage Basin. The PROTECO facility lies in a drainage basin, which is 336 acres (1.36 km²). This was determined by using the USGS quadrant map N1800-W6637.5/7/-5. Only 210 acres (0.825 km²) drain directly onto the facility. The hillsides and slopes surrounding the facility consist of pitted, fractured, case-hardened, reprecipitated calcareous material. The sparse vegetation is anchored in cracks and cavities produced by expanding

root systems. The organic material consists of humus and is limited to the small depressions and crevices in the rocky pavement. This cover and the general semiarid climate has been reported by PROTECO employees to produce no run-off.

Storm frequency information, obtained from the U.S. Department of Commerce, indicates the 24-hour, 25-year storm is 12 inches. The surface drainage from the site is controlled as shown in Appendix D-6. Calculations of peak flows through these structures are shown. Design calculations and cross sections for the run-off run-on control system are shown in Appendix D-6 of the Part B Permit Application.

The surface drainage system at the facility will be upgraded as part of the work to be completed.

Stream Velocity. There is only one permanent stream, the Tallaboa River, near the site. Since it is well over 1 km (actually 2.4 km) from the PROTECO site, the Exposure Information Report (EIR) guidelines do not require reporting of stream velocity.

The unnamed shallow ditch mentioned above, which parallels the access road leaving the site, is indicated to be an intermittent stream on the USGS topographic map. This shallow ditch is the only potential surface water drainage point from the site. It travels westward toward the Tallaboa River Valley but diverts southward at Highway 2 and parallels the River through the refinery area before entering the Tallaboa Bay. In the 10 years of site operation before October 1985, there were no records of water standing or flowing along the entire length of the ditch. However, during the record storm of October 6 and 7, 1985, water flowed in the ditch, but there is no indication of how far it traveled. It is important to note that there was no breaching of existing containment structures during the storm.

Monitoring Data. According to EIR guidelines, water quality monitoring data for the Tallaboa River is not required for this report since the River is about 2.4 km from the site. In a research of available information, no surface monitoring data has been found for either the River or the Tallaboa Bay.

2.2.3 Air

Little air monitoring has been performed at PROTECO. One sampling round was conducted to protect worker health associated with drilling wells during 1985. An organic vapor analyzer (OVA) by Foxboro was used from September - November 1985. Total organic vapor levels only occasionally ranged as high as 10 ppm near the soils but were generally at background (zero ppm). These readings are available in field log books kept by Fred C. Hart Associates.

Potential atmospheric exposures to human populations due to facility operation are very limited because of the low population density nearby. The population within a 4-mile radius of the facility is estimated to be a maximum of 55,000 (based on 1980 Census data). Annex E presents the basis of this estimate. The residents nearest to the site are located over 1 mile (1.6 km) to the west in Seboruco. There are essentially no residents within a 1 mile radius from the site; about 4,000 live within a two-mile radius. Of the 55,000 potentially living within 4 miles of the site, about 82% live near Ponce about 3 to 4 miles east of the site.

2.2.4 Subsurface Gas

No municipal-type waste will be accepted in the proposed regulated units of the facility. Furthermore, no gas conduits are located within 1000 feet of the property boundary. Consequently, no monitoring for subsurface gas release is required on site.

2.2.5 Soil

Investigations of possible soil contamination have been carried out at the site. Soil contamination data is currently being assembled and will be submitted.

2.3 Transportation Information

A general description of vehicle types used to transport wastes to and from the facility including the estimated number of daily arrivals is

contained in Section B-4, Part B Permit Application. Transportation routes to the site and on-site traffic patterns are also documented in Section B-4. Cleanup procedures for spills and leaks from transportation of wastes on-site are described in the Contingency Plan, Section G-6, Part B Permit Application.

2.4 Management Practices Information

There are 29 employees at the PROTECO site. In addition to the technical director, there are 3 supervisors, 1 chemist, 1 quality control person, 2 office staff, 3 transportation workers, 3 maintenance workers, 6 laborers, and 7 security guards. The organization training program for the PROTECO workers is outlined in Section H, Part B Permit Application.

Only one transportation accident has occurred at the site. In a telephone conversation, Enrique Negrón (the Facility Chemist) reported that a tank truck ruptured on entering the facility on February 9, 1982. About 4,000 gallons of oil sludge from Sun Oil of Yabucco spilled on the access road. A containment dike was built, and all stained soils were removed to the PROTECO landfarm.

There are no records available to indicate any occupational illnesses or workman's compensation claims associated with the ten year operation of the PROTECO facility.

2.5 Known Release Information

There is little information indicating whether chemicals have been released to the groundwater, surface water, or atmosphere either at or near the PROTECO site. Data on groundwater from the quarterly sampling program in January 1986 indicates low levels of groundwater release (see below). There are no data to indicate there have been any releases to surface waters near the site (Section 2.2.2). The only data on atmospheric releases is for total organic vapors measured on site with an organic vapor analyzer at well-drilling locations in fall 1985 (Section 2.2.3).

Low levels of a few groundwater contaminants have been detected in certain downgradient wells (Fred C. Hart Associates, 1986). Certain heavy metals were found including barium (up to 2.7 mg/l) and cadmium, chromium, and silver (up to a few ug/l). Concentrations of total organic carbon in the downgradient wells ranged from about 1 to 9.5 mg/l, not significantly different from the upgradient levels. Total organic halogens in the downgradient wells ranged from 0.07 to 2.3 mg/l, where the upgradient level was 0.06 mg/l.

Pesticides (lindane; methoxychlor; endrin; toxaphene; 2,4-D; and 2,4,5-T) and ten organic chemicals (benzene, trichloroethane, dichloroethane, chloroform, toluene, xylene, trichloroethylene, et al.), known to be received at PROTECO, were not detectable in the groundwater.

There are no off-site indicators to suggest:

- 1) Food-chain contamination due to agricultural or food preparation uses of contaminated water or soil.
- 2) Fish or wildlife kills or bioaccumulation.
- 3) Possible fires or explosions from methane migration.
- 4) Stressed vegetation due to exposures to hazardous wastes.

3.0 EXPOSURE POTENTIAL OF THE REGULATED FACILITIES

3.1 Introduction

Human exposure to waste or waste constituents from the planned PROTECO units requires that the following three conditions occur:

- o There must be a release of waste or waste constituents from the PROTECO landfills or surface impoundments to the environment (i.e., groundwater, surface water, air or soil);
- o There must be migration to or through an environmental pathway (i.e., groundwater, surface water, air or soil); and
- o There must be a population present to be exposed to the waste or waste constituents via inhalation, ingestion, or direct contact.

This section analyzes the potential for human exposure via reasonably foreseeable releases from the proposed landfills and surface impoundments to each environmental pathway. The subsections describe the environmental factors which affect the potential for human exposure and the engineering controls that reduce or eliminate potential releases. This analysis is based on information contained and/or referenced in Section 2.0 and Annex A of this report and the Part B Permit Application (February 1986).

3.2 Potential For Human Exposure via the Ground Water Pathway

Landfill Releases. The proposed landfills have been designed and will be operated to prevent releases of wastes or waste constituents to the groundwater (See Section D-6, Part B Permit Application). The landfills will have a double synthetic lining (80-mil HDPE) underlain by 3 feet of compacted clay (10^{-7} cm/second) with a dedicated leak detection system. The perimeter berm sideslopes and interim berms will be similarly lined. The surface water table will be a minimum of 10 feet below the landfill base.

The run-on control system is designed to intercept overland flow from the upland areas surrounding the site. A channel network is designed to carry a peak discharge from a 25-year, 24-hour storm around the facility (See Section D-6h(1), Part B Permit Application).

The run-off control system is designed to collect and control run-off from the active portions of the landfill. The system provides for all substages of landfill development. It uses perimeter channels, bench diversion channels, fluted inlets, drop inlets, culverts, silt fences, and various temporary channels, basins, and retention cells (Section D-6h(3), Part B Permit Application).

The whole facility is underlain by natural units of the Juana Diaz Formation, comprised of clayey chalk and mudstone overlying a hard limestone (situated at 0 to 300 feet deep). This soft clay-like rock formation lacks a well-developed soil profile and has low natural permeability (10^{-9} to 10^{-6} cm/sec.). The ground water found on site is highly mineralized and unfit as a drinking water source (See Section 2.2.1).

In addition to the design features and the hydrogeologic features, the stabilization/fixation of selected wastes described in Section D-9, Part B Permit Application will further reduce the likelihood of any landfill releases. The stabilization/fixation process fixes sludges, solids, and liquid hazardous wastes in a matrix of cement kiln dust, limestone, fly-ash, and water. The solidified mass is stable and does not cause slumping, landslides, or erosion.

The possibility of landfill releases can sometimes exist after landfill closure. However, the plan for landfill closure is designed to prevent releases (see Section I, Part B Permit Application).

As a final precaution, PROTECO will continue for 30 years after closure its groundwater monitoring programs which would identify any landfill releases before they could migrate off-site (Section E, Part B Permit Application).

Surface Impoundment Releases. Three surface impoundments are proposed for the PROTECO facility (Section D-4, Part B Permit Application). They are two leachate impoundments (A and B), located between the two proposed landfills, and a stormwater retention impoundment near the facility entrance. Impoundments A and B will contain only leachate from the active landfill operations; the stormwater retention impoundment will contain any contaminated surface run-off from the Tank Farm and Container Storage Area only and will also function as an emergency spill containment facility for these units.

To prevent releases to groundwater from the three impoundments, each impoundment will have a double synthetic lining (80-mil HDPE) underlain by 3 feet of compacted clay (10^{-7} cm/second) with a dedicated leak detection system. (Section D-4, Part B Permit Application).

In addition, protection from overtopping will be provided (Section D-4h, Part B Permit Application). The two leachate ponds form a redundant system with one being actively used at a time and the other providing overtopping protection. A freeboard space (2 feet) will be maintained using a high-level alarm. The Stormwater Retention Impoundment is designed to store: run-off from Tank Farm Secondary Containment Areas, transferred by manual pumping; liquid from a 100-year, 24-hour storm; and provide a minimum two-foot freeboard. A high level alarm will be activated when the pond level reaches the maximum storage level that would not permit inflow from the design storm. The surface impoundments will be inspected weekly and after every storm to determine if a sudden drop of a the level of liquids has occurred or if leaks have developed in the liner. If a leak or an emergency is indicated, emergency response procedures outlined in Section G-4 of the Part B Permit Application will be implemented.

The general site geology (as discussed in Section 2.2) will further inhibit groundwater releases. The in-situ soils under the impoundments are comprised of a clay, the Juana Diaz Formation, which is a hard, relatively incompressible soil. The stormwater retention impoundment at the Tank Farm will be founded in this substrata. Leachate Impoundments A and B will be founded in compacted soil fill above the in-situ material. This fill is

anticipated to be generated from the required excavations into the clay substrata at Landfills I and II.

Exposure Analysis. No human or other exposure is expected to occur via the groundwater pathway because of the following characteristics of the facility and its environment:

- (1) Careful design and operation of the proposed units to prevent releases;
- (2) Low permeability of underlying soils;
- (3) Naturally poor brackish water quality; and
- (4) Absence of nearby drinking wells and potential receptors.

The above summaries of potential landfill and impoundment releases indicate how design and operational features will preclude releases to the groundwater from the regulated units. The potential for human exposure, thus, is virtually non-existent in the absence of a release.

In the unlikely event that a significant release to groundwater does occur, the actual potential for human exposure is limited by the (1) presence of a groundwater monitoring program (Section E, Part B Permit Application), (2) very limited number of known or potential groundwater consumers, and (3) poor quality and productivity of groundwater found on site and nearby. In summary, available information indicates that any potential release of contaminants to the subsurface from site operations would have little, if any, impact on local groundwater resources.

3.3 Potential for Human Exposure via the Surface Water Pathway

Landfill Releases. The proposed landfills are designed and will be operated to prevent releases of wastes and waste constituents to surface water (see Section 3.2 of this report and Section D-6, Part B Permit Application). Such releases are restricted through design and operating procedures.

Releases to surface water will be prevented primarily by the run-off control system which has been designed to meet the 25-year 24-hour storm and prevent contaminated run-off from leaving active areas. For the proposed landfills, the liner/leachate collection system will also prevent a release to surface water via possible groundwater discharge. Furthermore, the facility could not be flooded by the only nearby permanent stream, since PROTECO is 70 meters above the Tallaboa River's 100-year flood zone.

The only drainage from the site is a small intermittent stream, actually a ditch, that parallels the access road. In the 10 years of site operation prior to October 1985, site personnel reported that they saw no water standing or flowing in the ditch. During the record rainfall event of October 1985, however, the access road was closed down from the site due to soil movement. During this time, however, none of the dikes or berms surrounding the waste holding facilities failed.

Surface Impoundment Releases. The proposed surface impoundments are designed and will be operated to prevent releases of wastes and waste constituents to surface water (see Section 3.2 of this report and Section D-6 of the Part B Permit Application).

Exposure Analysis. The previous sections have described how design and operational features will normally preclude surface water releases from the regulated units. In the unlikely event of a release of waste or waste constituents at the facility, the materials will normally be contained and removed, as in the Contingency Plan (Section G, Part B Permit Application), prior to reaching surface waters. If containment was unsuccessful, for some unforeseeable reason, materials might reach the drainage ditch. Only in the most unusual storms may the released materials travel in the ditch and possibly reach the Tallaboa River or Bay.

As discussed in Section 2.2.1 of this report, the lower Tallaboa River Valley is only a very minor source of public water supply. The water sources for the nearby towns of Penuelas and Seboruco are located well upstream from the potential confluence of the intermittent stream leaving the site and the Tallaboa River. The volume of Tallaboa River water would substantially dilute

any conceivable releases of contaminants. Finally, since the lower Tallaboa is estuarine, the total risk of contaminating public drinking water via releases to surface water from can be considered negligible.

3.4 Potential for Human Exposure via the Air Pathway

Landfill Releases. The two proposed landfills will be operated to minimize the release of wastes or waste constituents to the air. To prevent or minimize landfill releases to air, selected wastes will be mixed with cement kiln dust and water forming a paste-like slurry that solidifies, thus stabilizing the wastes. When the active lives of the proposed landfills are over, they will be covered with a clay and synthetic membrane cap to further inhibit landfill releases.

Ignitable wastes to be disposed in the landfill are less likely to produce air releases because the wastes will be stabilized or fixed upon placement in the landfill. Reactive wastes will not be accepted at the landfill.

Special handling, treatment and mixing procedures employed at the facility to prevent violent reactions, fires, and explosions include:

- o segregating incompatible wastes,
- o surveying work areas for sources of ignition or open flame,
- o grounding vehicles to prevent static discharges, and
- o using only compatible handling equipment.

Additional details on special handling, treatment and mixing procedures are contained in Sections C and F, Part B Permit Application. With these preventive controls and inspections, negligible releases to air are expected from landfill areas.

Surface Impoundment Releases. Air releases from surface impoundments are largely a function of the contents. Impoundments A and B will contain only leachate from the active landfill operation. The stormwater impoundment will contain contaminated surface runoff from the tank farm and container storage area and will provide emergency spill containment for the units. In this capacity, the contents of the impoundment should be relatively dilute.

Exposure Analysis. Although measures will be taken to prevent releases, small quantities of volatiles and/or particulates that may be released from the proposed PROTECO units are likely to be readily dispersed by the climatic conditions in the site area. The prevailing easterly winds and the rapidly changing atmospheric conditions due to the close proximity of the Caribbean Sea minimize the frequency of inversions. Thus, any air releases from the facility are likely to be dispersed rapidly to low levels. Furthermore, the very small receptor population size within a mile or two from the site will minimize any potential human exposure.

Since the prevailing winds are from the east, however, the downwind population to the west has a somewhat higher potential for exposure than other groups. Based upon census data presented in Annex E, the downwind population within four miles from the site is conservatively estimated to be fewer than 5,000. However, since the regional air quality is also potentially affected by oil refineries and other industries about 2 miles to the southwest, the potential exposure from the site itself may be contributed to by the other facilities as well.

3.5 Potential for Human Exposure from Subsurface Gas Releases

None of the proposed units will accept municipal wastes, and no conduits for carrying subsurface gases are known to be near the facility. Thus, no subsurface gas releases are expected from proposed units at the PROTECO facility.

3.6 Potential for Human Exposure From Releases to Soil

Landfill and Surface Impoundment Releases. Releases of waste or waste constituents to soil can occur primarily from wind dispersion and fallout of waste materials and small spills or leaks of waste materials. As described in Section 3.4, wind dispersion of waste is controlled by design and operating procedures including stabilization/fixation and immediate cover. Small spills will be cleaned up as a part of housekeeping procedures. In the event of a large spill, the on-site presence of appropriate emergency equipment and other measures outlined in the contingency plan (Section G-4, Part B Permit Application) will minimize releases to the soil.

Exposure Analysis. In the event of the release to soil, on-site and off-site exposure to waste or waste constituents can potentially occur. As previously discussed, spilled wastes will be cleaned up promptly; therefore on-site workers can be expected to have minimal exposure to contaminated soil. On-site exposure can also result from unauthorized entry to the facility. Such exposure, however, is unlikely due to security procedures that include a barbed wire fence, a single access gate which is normally closed, and a full-time security service (Section F, Part B Permit Application). Airborne wastes which may be deposited within the run-off containment system will not leave the site and will be properly managed as described in Section 3.3. Airborne wastes which are deposited outside of the containment system may ultimately be transported to the Tallaboa River Valley, although it appears unlikely.

Because the lower Tallaboa River and nearby wells are not used for water supply, human exposure from all releases will be very limited. Due to dilution, the concentrations of any that conceivably could reach the River or Tallaboa Bay would be expected to be below detectable limits.

Caribbean fish populations, recreational fishermen, and boaters may be the major potential receptors in the event that contaminated soils or sediments are discharged into the Tallaboa River. Dilution factors in the Tallaboa Bay would be large enough, however, to lower any contaminant concentrations to insignificant levels.

Data on wildlife populations and recreational users in this area of Puerto Rico were not available, but EQB personnel indicated that there is relatively little recreational use.

Land use immediately around the facility is non-residential and non-agricultural although some cattle grazing occurs near where the drainage ditch enters the Tallaboa Valley. Therefore, there is little potential for exposure via soil releases to the human food chain.

3.7 Potential for Human Exposure from Transportation-Related Releases

The potential for human exposure due to transportation-related releases is expected to be minimal at the PROTECO site. First, there are no residents along the access road which is over 1 mile long. Second, the relatively few trucks coming to the site daily will enter through a single, guarded access gate. Third, traffic patterns will be laid out quite clearly over the entire site minimizing the potential for exposure from on-site transportation accidents.

Plans for emergency spill clean-ups have been addressed in Section G of the Part B Permit Application. With the transportation, routing, and clean-up controls planned at PROTECO, human exposure from transportation releases is expected to be minimal.

3.8 Potential for Human Exposure from Worker-Management Practices

The absence of occupational illnesses or workman's compensation claims and the occurrence of only a single traffic accident in the 10 years of the site operations indicate the good quality of the existing management practices. Extensive orientation and safety training will be given to PROTECO employees before they work in hazardous areas. Section H of the Part B Permit Application contains details on personnel training materials, job duties, and training for emergency response.

A description of the Contingency Plan is included in section G, Part B Permit Application. This include details on emergency response procedures, emergency equipment, coordination agreements, evacuation plans, and required reports.

4.0 REFERENCES

- Grossman, I.G. 1962. Groundwater Conditions in the Lower Tallaboa Valley, Puerto Rico: U.S. Geological Survey Prof. Paper 424-C.
- Grossman, I.G.; Bogart, D.B.; Crooks, J.W.; and Dias J.R. 1972. Water Resources of the Tallaboa Valley. Commonwealth of Puerto Rico Water Resources. Bulletin 7.
- Hart Associates, Inc. 1986. Groundwater Monitoring Results of Sampling First Quarter 1986.
- Krushensky, R.D. and Monroe, W.H. 1978. Geologic Map of the Penuelas and Punta Cuchara Quadrangles, Puerto Rico, Map I - 1042. U.S. Geological Survey.
- Ressy, M.S. 1983. Hydrogeological Conditions at the Carbareon Waste Disposal Site.
- Ressy, M.S. 1985. Written Communication with M.S. Ressy - Geologic Engineer, Guaynabo, Puerto Rico.
- Rickher, et al. 1970. Water Records of Puerto Rico 1964 - 1967, Volume 2 - South and West Slopes. United States Department of the Interior.
- Servicios Carbareon, Inc. 1981. Final Environmental Impact Statement.

ANNEX A
INFORMATION REQUIREMENTS CHECKLIST

PROTECCION TECNICA ECOLOGICA, INC. (PROTECO)
PONCE, PUERTO RICO

ANNEX A. INFORMATION REQUIREMENTS CHECKLIST

| Reg. Cite | Description | Document Number (Section)* |
|-----------|-------------|----------------------------|
|-----------|-------------|----------------------------|

1. General Information

Information Typically in a Part B Application

| | | |
|--|---|--------------|
| 270.14(b)(1) | General description of facility | I (B-1) |
| 270.14(b)(2) and (3) | Chemical and physical analyses of wastes | I (C-1, C-2) |
| 270.14(b)(4) | Access control and security description of active portion | I (F-1) |
| 270.14(b)(5), 270.17(d), and 270.21(d) | General Inspection schedule and procedures | I (F-2) |
| 270.14(b)(6) | Preparedness and prevention documentation | I (F-4) |
| 270.14(b)(7) | Contingency plan | I (G) |
| 270.14(b)(8) | Preventive procedures | I (F-4, F-5) |
| 270.14(b)(11)(f) and (ff) | Facility location information | I (B-2, B-3) |
| 270.14(b)(13) | Closure plan | I (I-1) |
| 270.14(b)(13) | Post-closure care plan | I (I-2) |
| 270.14(b)(17) | Documentation of insurance | I (I-8) |
| 270.14(b)(29) | Topographic map (site plotted on USGS quadrangle maps) | I (B-2) |
| 270.21(a) and 270.17(a) | List of wastes placed or to be placed in each unit | I (A, C) |

Additional Information

| | | |
|--|---|--------------|
| | Existing risk assessment reports and information, including liability insurance analyses, claims, and settlements | None |
| | Land use and zoning map(s) for an area of 4 miles around the unit | II (Annex B) |

* REFERENCE DOCUMENT

| Number | Name |
|--------|---|
| I | RCRA Part B |
| II | Exposure Information Report for proposed units (i.e. this report) |
| III | Exposure Information Report for existing units |
| IV | Groundwater Monitoring Program (Results of Sampling - First Quarter 1986) |

| Reg. Cite | Description | Document Number (Section)* |
|-----------|-------------|----------------------------|
|-----------|-------------|----------------------------|

Additional Information (Continued)

| | | |
|--|--|---------------------|
| | Existing aerial photographs of the facility | III (Annex D) |
| | Identify and summarize any waste analysis data not already submitted; provide additional data as discussed as text | None |
| | Current estimate of annual amount of waste received and description of any pretreatment process used | Not available and I |
| | Identification of any Federal, State, or local inspection or compliance records related to environmental and health programs; include descriptions of any major violations | II (2.1) |

2. Ground Water Pathway

Information Typically in a Part B Application

| | | |
|--------------------------------|--|--------------|
| 270.14(c)(1) | Interim status ground water monitoring results | IV |
| 270.14(c)(2) | Identification of uppermost aquifer, including flow rate and direction | IV |
| 270.14(c)(3) and 270.14(b)(19) | Topographic maps related to ground water protection (well location, water table elevation contours, etc.) | IV |
| 270.14(c)(4)(i) and (ii) | Description of existing contamination | IV |
| 270.14(c)(5) | Detailed plans for ground water monitoring program | I (E) |
| 270.14(c)(6) | Description of detection monitoring program (if applicable) | I (E) |
| 270.14(c)(7) and (c)(7)(ii) | Description of compliance monitoring program and characterization of contaminated ground water (if applicable) | N/A |
| 270.14(c)(7)(iv) | ACL demonstration (if any) | N/A |
| 270.14(c)(8) | Corrective action program (if applicable) | N/A |
| 270.17(b)(1) and 70.21(b)(1) | Description of liner and leachate collection systems (if applicable) | I (D-4, D-6) |

Additional Information

| | | |
|--|--|----------|
| | Existing map showing location of all known wells within three miles; number and location of drinking water wells | II (2.2) |
| | Discussion of ground water uses within three miles of unit | II (2.2) |

| Reg. Cite | Description | Document Number (Section)* |
|-----------|-------------|----------------------------|
|-----------|-------------|----------------------------|

Additional Information (Continued)

| | | |
|--|--|-----------------------|
| | Regional map showing areas of ground water recharge and discharge | None but see II (2.2) |
| | Net precipitation using net seasonal rainfall or other available data | II (2.2.1) |
| | Unless otherwise reported to EPA, available well data indicating a release, and information on any affected public or private water supplies, including populations served | Not Applicable |
| | Any known food chain contamination due to prior release from the unit to ground water | None |

3. Surface Water Pathway

Information Typically in a Part B Application

| | | |
|------------------------|--|--------------|
| 270.14(b)(11)(iii)-(v) | Location information related to 100 yr. floodplain including variance demonstrations | I (B-3, B-3) |
| 270.21(b)(2) | System for control of run-on from each peak discharge of a 25 yr. storm | I (D-4, D-6) |
| 270.21(b)(3) | System for control of run-off from a 24 hr., 25 yr. storm | I (D-4, D-6) |
| 270.17(b)(2) | Procedures/equipment to prevent overtopping | I (D-4, D-6) |
| 270.17(b)(3) | Structural integrity of dikes | I (D-4, D-6) |

Additional Information

| | | |
|--|---|---------------------|
| | Discussion of surface water uses within three miles of the unit, including a map showing the location of all surface water bodies and downstream drinking water intakes | II (2.2.1; Annex B) |
| | Velocities of streams and rivers passing through and adjacent to the property | II (2.2) |
| | Description of any system used to monitor the surface water quality, and a summary of the data | II (2.2) |
| | Description of known releases to surface water; the extent of contamination; remedial action, if any; and if known, severity of impact | None |
| | Any known food-chain contamination resulting from prior release from the unit to surface water | None |

| Reg. Cite | Description | Document Number (Section)* |
|-----------|-------------|----------------------------|
|-----------|-------------|----------------------------|

4. Air Pathway

Information Typically in a Part B Application

| | | |
|--|--|---------|
| 270.14(b)(9), 270.21(f) and (g), 270.21(h) and (i) | Documentation of procedures to prevent accidental ignition or reaction | I (F-5) |
| 270.21(b)(5) | Plans to control wind dispersal of particulate matter at landfills | I (D-4) |
| 270.14(b)(19)(v) | A wind rose showing prevailing windspeed and direction | I (B-2) |

Additional Information

| | | |
|--|--|-------------------------|
| | Summary of air monitoring data and a description of current monitoring system, if any | None but see II (2.2.3) |
| | Population within a four mile radius of the unit | II (2.2.3) |
| | Describe any known releases to air; the extent of contamination; remedial action, if any; and severity of impact, if known | None but see II (2.2.3) |

5. Subsurface Gas Pathway

Information Typically in a Part B Application

See General Information

Additional Information

| | | |
|--|---|----------|
| | Any past disposal of municipal-type wastes in the unit; approximate quantities and dates of disposal, if known | II (2.2) |
| | Map location of any underground conduits within the site and known underground conduits within 1000 feet of property boundary | None |
| | Descriptions of any monitoring or control mechanisms for subsurface gas release; summarize resulting data | None |
| | Description of any known releases; extent of contamination; remedial action taken, if any; and the severity of impact, if known | None |

| Reg. Cite | Description | Document Number (Section)* |
|-----------|-------------|----------------------------|
|-----------|-------------|----------------------------|

6. Contaminated Soil Pathway

Information in Part B Application

See General Information

Additional Information

| | | |
|--|--|-------------------|
| | If soil sampling has been done, a map showing areas of soil contamination, and a summary of analytical results | Not available yet |
| | Description of the types of major releases that resulted in soil contamination, and any clean-up action | None |
| | Any known food-chain contamination resulting from the use of contaminated soils for raising crops | None |

7. Transportation Information

Information Typically in a Part B Application

| | | |
|---------------|---|--------------|
| 270.14(b)(10) | Traffic pattern, volume, and controls; access road characteristics | I (B-4) |
| | Description of the types and capacities of vehicles used to transport waste | I (B-4, C-3) |
| | Identification of normal transport routes for hazardous waste into the site and within one mile of the facility entries | I (B-2, B-4) |
| | Description of procedures for clean-up of transportation-related spills or leaks | I (G) |
| | Descriptions of any transportation accidents releasing hazardous wastes on-site, or in the immediate vicinity | II (2.4) |

8. Management Practices Information

Information Typically in a Part B Application

| | | |
|-----------------------|---|-------|
| 270.14(b)(12), 264.16 | Outline of programs to train employees to safely operate and maintain facility, including emergency response activities | I (H) |
|-----------------------|---|-------|

Additional Information

Summary of existing records on worker illness
or injury, related to the operation of the unit;
include summaries of Workman's Compensation claims,
or hospital records

None

ANNEX B
LAND USE MAP

ANNEX C

RCRA INSPECTION REPORT (November 1985)



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II
40 FEDERAL PLAZA
NEW YORK NEW YORK 10178

File # 100

Dr. Jorge J. Fernandez
Proteccion Tecnica Ecologica, Inc.
Firm Delivery
Ponce, Puerto Rico 00731

Re: PROTECO
EPA I.D. NO. PRD091018622

Dear Dr. Fernandez:

Attached please find a written summary of the violations identified during an inspection of the above-referenced facility that took place during the period from November 14 through 23, 1985.

During the inspection, EPA found that your facility was not complying with provisions of the Commonwealth Regulations for the Control of Hazardous and Non-Hazardous Solid Waste (RCHNSW). On the basis of these findings, therefore, EPA has determined that your facility is operating in violation of Commonwealth of Puerto Rico Environmental Public Policy Act and various regulations promulgated thereunder. The attachment indicates both the particular violations identified during the inspection and the applicable regulation.

The attached list is intended to be informative, but not necessarily comprehensive. Furthermore, nothing in this letter precludes EPA from taking appropriate enforcement action on these or any other violations identified during the course of this or any other inspection. This letter serves only as a summary of the findings of the inspection, and are intended to assist Mr. Raul G. Gaya, your newly appointed manager, in correcting the violations as expeditiously as possible.

Should you have questions on this matter, please contact Mr. Ton H. Moy at (212) 264-6156.

Sincerely yours,

Richard M. Walka

Richard Walka
Chief, Solid Waste Branch

Attachment

cc: Jesus Medero, Director
Land Pollution Control, EQB

ATTACHMENT

1. Rule 807(I) of RCHNSW requires that the owner or operator of a hazardous waste treatment, storage or disposal facility must develop and follow a written waste analysis plan. At the time of inspection, information present at your facility was insufficient to meet the requirements of this Section. You were therefore in violation of Rule 807(I) of RCHNSW.
2. Rule 803(F) of RCHNSW requires that the owner or operator of a hazardous waste facility must develop and follow a written schedule of inspections for certain specified portions of its facility. The owner or operator must also retain a record of these inspections in a log or summary. At the time of the inspection, problems (i.e., mercury spill, drums partially collapsed) were not documented and taken care of. You were therefore in violation of Rule 803(F) of RCHNSW.
3. Rule 808(C) of RCHNSW requires that the owner or operator of a hazardous waste facility must maintain written documentation of personnel, jobs, and job-related training conducted at the facility. Documentation which existed at the time of the inspection was insufficient to meet the requirements of this section. You were therefore in violation of Rule 808(C) of RCHNSW.
4. Rule 809 of RCHNSW requires that ignitable and reactive waste be protected from sources of ignition and reaction. At the time of the inspection, the protection being provided from sources of ignition and/or reaction was insufficient to meet this requirement. Containers were exposed in direct sunlight. You were therefore in violation of Rule 809 Of RCHNSW.
5. Rule 810(B) of RCHNSW requires that facilities must be maintained and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waster constituents to air, soil, or surface water which could threaten human health or the environment. At the time of the inspection, it was discovered that your facility did not meet the requirement (i.e., in direct sunlight, incompatible waste mixed with other waste, and unlined impoundments). You were therefore in violation of Rule 810(B) of RCHNSW.
6. Rule 810(C) of RCHNSW requires that fire extinguishers, fire control equipment and spill control equipment be present at the facility of sufficient quantity and volume. On the date of the inspection, it was noted that the fire extinguishers, fire control equipment and decontamination equipment were not of sufficient quantity and volume. You were therefore in violation of Rule 810(C) of RCHNSW.
7. Rule 810(D) of RCHNSW requires all facility communications or alarm systems, fire protection equipment, spill control equipment, and decontamination equipment, where required, must be tested and maintained as necessary to assure its proper operation in time of emergency. At the time of the inspection, it was revealed that the minimal fire protection equipment had not been tested and maintained. You were therefore in violation of Rule 810(D) of RCHNSW.

8. Rule 810(E) of RCHNSW requires that there be immediate access to alarms or facility communication in the hazardous waste areas during the handling of hazardous waste. At the time of inspection, there was no such access near the waste management areas, except in the container area. You were therefore in violation of Rule 810(E) of RCHNSW.
9. Rule 810(F) of RCHNSW requires tht the owner or operator must maintain sufficient aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of the facility operating in an emergency unless aisle space is not needed for any of these purposes. At the time of the inspection, insufficient aisle space was noted between drums. You were therefore in violation of Rule 810(F) of RCHNSW.
10. Rule 810(G) of RCHNSW requires that the owner or operator must attempt to make arrangements with local authorities, as appropriate, for the type of waste handled at the facility and the potential need for the services of these organizations. At the time of the inspection, no arrangements had been made with local authorities. You were therefore in violation of Rule 810(G) of RCHNSW.
11. Rule 207 of RCHNSW requires that the owner and operator of a hazardous waste facility must have an adequate written contingency plan for the facility that is designed to minimize hazards to human health or the environment from any unplanned release of hazardous waste constituents. Rule 803(E) of RCHNSW describes the required contents of the contingency plan. At the time of the inspection, the content of this plan (i.e., evacuation plan, list of equipment on-site and the potential problems or remedies) was insufficient to meet the requirements of this section. You were therefore in violation of Rule 207 of RCHNSW.
12. Rule 207 of RCHNSW requires that copies of the contingency plan [required by Section 803(E)] be maintained at the facility and be submitted to local police and fire departments, hospitals and other official agencies who might be called upon in an emergency. At the time of the inspection, copies of the plan had not been distributed in compliance with this section. You were therefore in violation of Rule 207 of RCHNSW.
13. Rule 504(D)(2) of RCHNSW lists the procedures for manifest discrepancies. At the time of the inspection, waste analysis had not been performed on waste received to ensure that the waste matches the identify designated on the manifest. You were therefore in violation of Rule 504(D)(2) of RCHNSW.
14. Rule 502(C) of RCHNSW requires that the owner or operator of a hazardous waste facility maintain an operating record at the facility containing certain required information, including a description of the type, quality, and location of all wastes held at the facility. At the time of the inspection, the location and quantity of the hazardous wastes had not been identified. You were therefore in violation of Rule 502(C) of RCHNSW.

15. Rule 503(C) of RCHNSW requires that the owner or operator of a hazardous waste facility must report:

- a) Releases or any disruptions from authorized operating procedures;
- b) Monitoring data; and
- c) Closure operations.

At the time of the inspection, the owner or operator had not submitted the release, monitoring data and closure operations reports as required by this section. You were therefore in violation of Rule 503(C) of RCHNSW.

16. Rule 804(A) of RCHNSW requires that, within one year after the effective date of this regulation (i.e., before November 13, 1981), the owner or operator of a surface impoundment, landfill, or land treatment facility which is used to manage hazardous waste must implement a groundwater monitoring program capable of determining the facility's impact on the quality of the groundwater in the uppermost aquifer underlying the facility. At the time of the inspection, the overall groundwater monitoring program at this facility was inadequate to meet the requirements of this section. You were therefore in violation of Rule 804(A) of RCHNSW.

17. Rule 804(B) of RCHNSW requires that the groundwater monitoring system must be installed to meet the requirements of this section. At the time of the inspection, the overall groundwater monitoring system at your facility was inadequate to meet the requirement. You were therefore in violation of Rule 804(B) of RCHNSW.

18. Rule 804(C) of RCHNSW requires that the owner or operator of a hazardous waste facility must develop and follow a groundwater sampling and analyses plan. At the time of the inspection, the owner or operator had not developed and followed a groundwater sampling and analyses plan on all the RCRA regulated units. You were therefore in violation of Rule 804(C) of RCHNSW.

19. Rule 804(D) of RCHNSW requires that, within one year after the effective date of this regulation (i.e., before November 13, 1981), the owner or operator must prepare an outline of a groundwater quality assessment program. At the time of the inspection, the outline of a groundwater quality assessment program had not been prepared. You were therefore in violation of Rule 804(D) of RCHNSW.

20. Rule 805(A) of RCHNSW requires that the owner or operator must close the facility in accordance with the closure performance standard. At the time of the inspection, the closure performance standard had not been followed. You were therefore in violation of Rule 805(A) of RCHNSW.

21. Rule 805(A)(3), (5), and (7) of RCHNSW lists the closure plan requirements and its procedures. At the time of inspection, closure plan requirements and its procedure had not been met. You were therefore in violation of Rule 805(A)(3), (5), and (7) of RCHNSW.
22. Rule 805(B) of RCHNSW lists the post-closure requirements. At the time of the inspection, closure requirements had not been met. You were therefore in violation of Rule 805(B) of RCHNSW.
23. Rule 812(C) of RCHNSW states that if a container holding hazardous waste is not in good condition, or if it begins to leak, the owner or operator of the hazardous waste facility must either transfer the hazardous waste from this container to a container that is in good condition or manage the waste in some other way that complies with the requirements of this part. At the time of the inspection, one of the containers had a large indentation on its side. You were therefore in violation of Rule 812(C) of RCHNSW.
24. Rule 812(B)(1) of RCHNSW states that the hazardous waste facilities that store containers of hazardous waste must have a continuous base which is impervious to the stored waste and which is constructed so that any surface runoff or spill can be contained until the spilled waste can be removed for either treatment or final disposal. At the time of inspection, the surface was soil and there was no dike system to prevent run-on, or to segregate incompatible waste types. You were therefore in violation of Rule 812(B)(1) of RCHNSW.
25. Rule 812(B)(3) of RCHNSW states that, if exposure of the containers to moisture or direct sunlight will create a hazardous condition, the facility operator shall store the containers in an area with a roof or other overhead covering that does not obstruct the visibility of labels. At the time of the inspection, a roof covering the area was inadequate to prevent direct sunlight or rainwater from contact with the drums. You were therefore in violation of Rule 812(B)(3).
26. Rule 812(B)(4) of RCHNSW states that the owner or operator storing hazardous waste containers shall provide sufficient confinement structures to contain leakage or spills within the designed storage area, including, but not limited to, dikes, berms or trenches. At the time of the inspection, there were no dikes or berms to contain leakage or spills within the designated storage area. You were therefore in violation of Rule 812(B)(4) of RCHNSW.
27. Rule 812(D)(3) of RCHNSW lists the requirements for handling incompatible waste. At the time of the inspection, incompatible waste had been stored in the same container with ignitable or reactive waste. You were therefore in violation of Rule 812(D)(3) of RCHNSW.
28. Rule 813(D) of RCHNSW requires the owner or operator of a tank to inspect a number of variables related to the tank at regular intervals. At the time of the inspection, the owner or operator inspections were not performed according to the required schedule. Also, required variables that weren't present include no discharge control for the tank or any monitoring equipment. You were therefore in violation of Rule 813(D) of RCHNSW.

29. Rule 817(B) of RCHNSW sets the general operating requirements for surface impoundments. At the time of the inspection, the owner or operator had not met all of the general operating requirements. You were therefore in violation of Rule 817(B) of RCHNSW.
30. Rule 817(B)(15) of RCHNSW requires all earthen dikes have an outside protective cover (e.g., grass, shale or rock) to minimize erosion by wind and/or water. At the time of the inspection, all surface impoundments had no protective cover. You were therefore in violation of Rule 817(B)(15) of RCHNSW.
31. Rule 817(C) of RCHNSW states that, in addition to the waste analysis requirement in Section 807(I), whenever a surface impoundment is to be used to either:
- a) Chemically treat a hazardous waste which is substantially different from the waste previously used in that impoundment; or
 - b) Chemically treat a hazardous waste with a substantially different process than any previously used in that impoundment, the owner or operator, before treating the different waste or using the different process, must:
 - 1) Conduct a waste analysis and trial treatment test (e.g., bench scale or pilot scale test); or
 - 2) Obtain written, documented information on similar treatment of similar waste under similar operating conditions to show that this treatment will comply with Section 809(B).
- At the time of the inspection, waste analysis was not being performed or conducted properly. You were therefore in violation of Rule 817(C) of RCHNSW.
32. Rule 817(G) of RCHNSW states the special requirements for ignitable or reactive waste. At the time of the inspection, ignitable or reactive waste was being placed in surface impoundments. You were therefore in violation of Rule 817(G) of RCHNSW.
33. Rule 817(H) of RCHNSW states the special requirements for incompatible waste. At the time of the inspection, incompatible waste was being placed in the same surface impoundment with reactive or ignitable waste. You were therefore in violation of Rule 817(H) of RCHNSW.
34. Rule 819(B) of RCHNSW sets the general operating requirements for land treatment facilities. At the time of the inspection this requirement was not being met (i.e., prevention of run-on or run-off). You were therefore in violation of Rule 819(B) of RCHNSW.

35. Rule 819(C) of RCHNSW states that in addition to the waste analysis required by Section 807(I), before placing a hazardous waste in or on a land treatment facility, the owner or operator must:
- a) Determine the concentration in the waste of any substances which exceed the maximum concentrations in Rule 604 of this regulation that cause the waste to exhibit the EP toxicity characteristics; and
 - b) For any waste listed in Rule 608, determine the concentrations of any substance which caused the waste to be listed as a hazardous waste.

At the time of the inspection, waste analysis was not being performed in accordance with Rule 819(C). You were therefore in violation of Rule 819(C) of RCHNSW.

36. Rule 819(G) of RCHNSW sets the requirements of unsaturated zone monitoring for land treatment facilities. At the time of the inspection, the owner or operator had not prepared or implemented an unsaturated zone monitoring plan. You were therefore in violation of Rule 819(G) of RCHNSW.
37. Rule 819(H) of RCHNSW requires that the owner or operator of a land treatment facility must keep records of the application dates, application rates, quantities, and location of each hazardous waste placed in the facility. At the time of the inspection, documents available had not identified the application rates, quantities, and location of each hazardous waste placed in the facility. You were therefore in violation of Rule 819(H) of RCHNSW.
38. Rule 819(I) of RCHNSW sets the closure and post-closure requirements for land treatment facilities. At the time of the inspection, closure and post-closure plan did not meet the requirements. You were therefore in violation of Rule 819(I) of RCHNSW.
39. Rule 819(J) and (K) of RCHNSW states, in part, the special mixing requirements for ignitable, reactive and incompatible waste. At the time of the inspection, ignitable, reactive and incompatible wastes were being placed in the land treatment facilities without properly being mixed. You were therefore in violation of Rule 819(J) and (K) of RCHNSW.
40. Rule 816(B) of RCHNSW sets the general requirements for landfills. At the time of the inspection, it was revealed that your facility did not meet the general requirements (i.e., prevention of run-on and run-off, liner systems, and gas collection and control system). You were therefore in violation of Rule 816(B) of RCHNSW.
41. Rule 816(B)(6) of RCHNSW requires that the exact position of each hazardous waste and of each cell shall be located and recorded with respect to permanently surveyed bench marks. The contents of each cell shall also be recorded and these records shall be retained. At the time of the inspection, no such documents were available. You were therefore in violation of Rule 816(B)(6) of RCHNSW.

42. Rule 816(C) of RCHNSW sets the closure and post-closure requirements for landfills. At the time of the inspection, closure and post-closure plan did not meet the requirements. You were therefore in violation of Rule 816(C) of RCHNSW.
43. Rules 816(D) and (E) of RCHNSW lists the special requirements for ignitable, reactive and incompatible waste. At the time of the inspection, ignitable, reative and incompatible wastes were being placed in landfills without being properly treated or mixed. You were therefore in violation of Rules 816(D) and (E) of RCHNSW.
44. Rule 816(F) of RCHNSW states the special requirements for liquid waste. At the time of the inspection, liquid wastes were being placed in the landfills. You were therefore in violation of Rule 816(F) of RCHNSW.

PROTECO
FIRM DELIVERY
PONCE, PUERTO RICO 00731

March 21, 1986

Mr. Richard Walka
Chief, Solid Waste Branch
U.S. Environmental Protection
Agency
Region II
26 Federal Plaza
New York, N.Y. 10278

Dear Mr. Walka:

We appreciate your forwarding to us a summary of the results of your November, 1985 visit to the site.

We have already begun to make adjustments to our operation, in order to maintain proper compliance with EPA and EQB's regulations. Additionally, we have retained the services of Lebrón Associates, whose principal and staff includes a past vicepresident of the Environmental Quality Board and a past director of the land pollution control program of EQB. Furthermore we are currently implementing management changes to guarantee the effective function of this facility.

I hereby attach a summary of our efforts in the different areas of the facility.

Sincerely,



Raúl A. Gayá
Technical Director, PROTECO

Waste Analysis and Waste Stream Approvals

No waste movements are permitted on the site without the express permission of the Technical Director. Further, a meeting has been held with all major generators advising them of the status of the facility as well as specific Waste Analysis Plan requirements. Currently, hazardous wastes are only being accepted for storage in the Container Storage Area. Additionally, non-hazardous wastes are being carefully pre-screened to assure that no liquid bearing wastes are accepted, and "paint filter" tests are also run on incoming loads, to assure that only solids are disposed of. Finally, the Technical Director has visited a major mainland hazardous waste management facility and reviewed procedures in effect there, holding "peer review" discussions with that facility's management personnel.

Container Storage Area

The Container Storage Area has been upgraded. Aisle space has been provided, and containers are stored by waste classes; berms separate incompatible wastes. Also, roofs have been constructed for storage of ignitables, in conformance with Commonwealth regulations. Inventories of each class are now being maintained.

Revegetation

Specifications were recently submitted to the Agency for revegetation procedures to be followed for the site as a whole. These specifications are based on local recommendations from agricultural and/or conservation specialists. The facility has contacted firms who can complete this work and anticipates that revegetation of surface impoundment berms can be completed by Summer 1986.

Safety Equipment

The facility will have acquired all safety equipment as per the Consent Agreement by April 1986. Safety alarm horns will be installed at all units by March 1986. A procedure wherein at least two people are required for site work has already been implemented. Inspection recordkeeping procedures for testing and inspection of safety and fire equipment are currently being upgraded.

Training Activities

Training activities have been upgraded, and supervisory employees have already attended a seminar on hazardous chemicals, transportation and handling. Bi-weekly training for all facility personnel is also being implemented. Documentation of that training has been completed is being maintained.

Status of Units

Impoundments are no longer used for hazardous waste storage or disposal, except the rainwater basin, which is being kept open for emergency use until the new facilities are constructed. Impoundments constructed of clay alone will be phased out as new facilities come on-line.

We are awaiting word on interim closures proposed to the Agency, and will complete notification of closure upon approval of the interim closure steps we have proposed.

These interim closures will make existing units more secure until final closure can be achieved at a later date, when the new facilities are open.

The landfill's (Unit 16) hazardous waste disposal capacity is being retained for emergency use. So that runoff is not a concern, cover will be maintained and the unit will only be used during dry weather. Runon control will be provided when the surfacewater plans are approved by the Agency and implemented. Gas collection/control is not applicable as the wastes in the unit are not putrescible. Liners will be provided in the new units; closure including waste excavation is proposed for this unit.

Groundwater Monitoring

A Consent Agreement regarding the entire groundwater monitoring program and overall site hydrogeology is being followed. Due to the complex but apparently favorable nature of the site hydrogeology, monitoring is complicated. However, wells have been installed for active units. Expanded studies of the site are planned and work plans are awaiting Agency approval. A new Groundwater Monitoring Plan for existing units has also been implemented, and a new lab has been engaged.

Field sampling methods have been upgraded and internal quality control checking has been implemented. Additionally, the outside laboratory is requesting a QC/QA Junction. Finally, water levels are being checked frequently in key wells to aid in the overall Hydrogeological Study effort.

ANNEX D

PROTECO RCRA COMPLIANCE STATEMENT
(March 1986)

PROTECO
FIRM DELIVERY
PONCE, PUERTO RICO 00731

March 21, 1986

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Field sampling methods have been upgraded and internal quality control checking has been implemented. Additionally, the outside laboratory is requesting a QC/QA Junction. Finally, water levels are being checked frequently in key wells to aid in the overall Hydrogeological Study effort.

ANNEX E

POPULATION DATA FOR AREA SURROUNDING PROTECO

Annex E - Population Data

Table 1. Population and Housing Unit Counts for Puerto Rico by Municipios and Municipio Subdivisions: 1980 and 1970—Con.

(Counts relate to areas as delineated at each census. Information on boundary changes will be shown in the PC80-1-A report for this area. For meaning of symbols, see text.)

| Puerto Rico Municipios Municipio Subdivisions | Population | | Housing units | | Puerto Rico Municipios Municipio Subdivisions | Population | | Housing units | |
|---|------------|--------|---------------|-------|---|------------|---------|---------------|--------|
| | 1980 | 1970 | 1980 | 1970 | | 1980 | 1970 | 1980 | 1970 |
| Moca Municipio—Con | | | | | Patillas Municipio—Con | | | | |
| La boma | 693 | 557 | 168 | (NA) | Mamey boma | 1 798 | (NA) | 449 | (NA) |
| La boma | 3 829 | (NA) | 1 073 | (NA) | Patillas zona urbana (pt.) | 1 201 | (NA) | 278 | (NA) |
| Moca zona urbana (pt.) | 1 640 | (NA) | 427 | (NA) | Mami boma | 1 313 | (NA) | 350 | (NA) |
| Rocha boma | 3 130 | 2 273 | 925 | (NA) | Patillas zona urbana (pt.) | 323 | (NA) | 86 | (NA) |
| Valderrama boma | 3 377 | 2 989 | 906 | (NA) | Mulas boma | 590 | 713 | 151 | (NA) |
| | | | | | Munoz Rivera boma | 567 | 715 | 172 | (NA) |
| Maroñas Municipio | 21 142 | 19 059 | 5 456 | 4 095 | Patillas pueblo | 1 126 | (NA) | 444 | (NA) |
| Maroñas boma | 2 914 | 2 035 | 789 | (NA) | Patillas zona urbana (pt.) | 1 126 | (NA) | 444 | (NA) |
| Maroñas aldea | 1 930 | 1 679 | 513 | (NA) | Patillas boma | 2 320 | (NA) | 602 | (NA) |
| Cuchillas boma | 1 021 | 1 023 | 256 | (NA) | Quebrada Arriba boma | 862 | 754 | 223 | (NA) |
| Francisco boma | 3 602 | 2 509 | 917 | (NA) | | | | | |
| Francisco aldea | 2 228 | 1 356 | 541 | (NA) | Rios boma | 493 | 696 | 151 | (NA) |
| San Llanos boma | 1 986 | (NA) | 502 | (NA) | | | | | |
| Maroñas zona urbana (pt.) | 1 065 | (NA) | 271 | (NA) | Penuelas Municipio | 19 116 | 15 973 | 5 299 | 3 553 |
| Maroñas pueblo | 1 457 | (NA) | 499 | (NA) | Barraza boma | 423 | 534 | 106 | (NA) |
| Maroñas zona urbana (pt.) | 1 457 | (NA) | 499 | (NA) | Cata boma | 1 031 | (NA) | 287 | (NA) |
| Maroñas Norte boma | 1 393 | (NA) | 394 | (NA) | Cuevas boma | 389 | 340 | 129 | (NA) |
| Maroñas zona urbana (pt.) | 115 | (NA) | 28 | (NA) | Encarnación boma | 838 | 1 429 | 480 | (NA) |
| | | | | | Talibao aldea | 1 059 | 1 155 | 241 | (NA) |
| Maroñas Sud boma | 1 650 | (NA) | 397 | (NA) | Jaguas boma | 1 752 | 1 397 | 482 | (NA) |
| Maroñas boma | 704 | 622 | 156 | (NA) | Penuelas zona urbana (pt.) | 754 | (NA) | 188 | (NA) |
| Maroñas boma | 942 | 1 088 | 218 | (NA) | Macana boma | 828 | 900 | 240 | (NA) |
| San Grande boma | 592 | 657 | 143 | (NA) | Penuelas pueblo | 2 279 | (NA) | 674 | (NA) |
| San Lorenzo boma | 1 047 | 1 054 | 252 | (NA) | Penuelas zona urbana (pt.) | 2 279 | (NA) | 674 | (NA) |
| Torreillas boma | 419 | 374 | 122 | (NA) | | | | | |
| Torreillas boma | 2 694 | 2 147 | 650 | (NA) | Quebrada Ceiba boma | 2 892 | 1 268 | 855 | (NA) |
| Torreillas boma | 721 | 656 | 161 | (NA) | Penuelas zona urbana (pt.) | 1 202 | (NA) | 389 | (NA) |
| | | | | | Rioa boma | 995 | 1 023 | 238 | (NA) |
| Naguabo Municipio | 20 617 | 17 996 | 6 921 | 5 026 | Santa Domingo boma | 3 687 | 2 396 | 964 | (NA) |
| Daguan boma | 2 003 | 2 294 | 745 | (NA) | Santa Domingo aldea | 1 884 | 1 721 | 465 | (NA) |
| Daguan aldea | 1 344 | 1 113 | 466 | (NA) | Talibao Alto boma | 1 625 | 1 721 | 441 | (NA) |
| Roosevelt Roads aldea (pt.) | | 460 | | (NA) | Talibao Alto aldea | 366 | 1 425 | 383 | (NA) |
| Dague boma | 2 568 | (NA) | 876 | (NA) | Talibao Poniente boma | 699 | 679 | 215 | (NA) |
| Dague aldea | 1 440 | | 489 | (NA) | Talibao Saliente boma | 678 | 758 | 188 | (NA) |
| Naguabo zona urbana (pt.) | 681 | (NA) | 200 | (NA) | | | | | |
| Naguabo boma | 1 418 | (NA) | 513 | (NA) | Ponce Municipio | 189 046 | 158 981 | 55 078 | 39 587 |
| Naguabo boma | 1 261 | (NA) | 383 | (NA) | Anon boma | 2 134 | 1 977 | 512 | (NA) |
| Naguabo boma | 1 450 | 1 407 | 536 | (NA) | Bucana boma | 4 179 | 547 | 186 | (NA) |
| Naguabo pueblo | 2 056 | (NA) | 847 | (NA) | Ponce zona urbana (pt.) | 1 179 | (NA) | 186 | (NA) |
| Naguabo zona urbana (pt.) | 2 056 | (NA) | 847 | (NA) | Canas boma | 121 900 | 5 381 | 992 | (NA) |
| | | | | | Ponce zona urbana (pt.) | 19 363 | (NA) | 5 072 | (NA) |
| San Pabre boma | 3 152 | 2 218 | 883 | (NA) | Canas Urbana boma | 12 258 | 23 947 | 6 718 | (NA) |
| Rio boma | 2 504 | (NA) | 869 | (NA) | Ponce zona urbana (pt.) | 22 253 | (NA) | 6 718 | (NA) |
| Naguabo zona urbana (pt.) | 1 398 | (NA) | 445 | (NA) | Capitanes boma | 1 409 | 1 343 | 405 | (NA) |
| Rio Blanco boma | 3 065 | 2 659 | 1 013 | (NA) | Capitanes aldea (pt.) | 596 | 489 | 157 | (NA) |
| Rio Blanco aldea | 1 433 | | 462 | (NA) | Cerrillos boma | 2 455 | 1 048 | 639 | (NA) |
| Sancho y Luma boma | 940 | 1 042 | 256 | (NA) | Ponce zona urbana (pt.) | 1 440 | (NA) | 363 | (NA) |
| | | | | | | | | | |
| Naranjo Municipio | 23 633 | 19 913 | 6 559 | 4 444 | Cata Laurel boma | 5 192 | 3 940 | 1 374 | (NA) |
| Achate boma | 3 727 | (NA) | 1 001 | (NA) | Cata Laurel aldea | 2 240 | 1 761 | 563 | (NA) |
| Naranjo zona urbana (pt.) | 934 | (NA) | 233 | (NA) | Ponce zona urbana (pt.) | 1 130 | (NA) | 42 | (NA) |
| San Juan boma | 3 218 | 2 310 | 852 | (NA) | Cuanto boma | 3 428 | 5 048 | 1 388 | (NA) |
| San Juan aldea boma | 3 205 | 2 649 | 880 | (NA) | Ponce zona urbana (pt.) | 3 428 | (NA) | 1 388 | (NA) |
| San Juan aldea boma | 2 281 | 1 830 | 604 | (NA) | Guaragua boma | 1 280 | 1 396 | 378 | (NA) |
| San Juan aldea boma | 3 248 | (NA) | 897 | (NA) | Machuelo Abajo boma | 15 593 | 10 487 | 4 322 | (NA) |
| Naranjo zona urbana (pt.) | 151 | (NA) | 47 | (NA) | Ponce zona urbana (pt.) | 15 593 | (NA) | 4 322 | (NA) |
| Lomas boma | 3 004 | 2 528 | 854 | (NA) | Machuelo Arriba boma | 11 703 | 18 218 | 2 993 | (NA) |
| Naranjo pueblo | 1 764 | (NA) | 587 | (NA) | Ponce zona urbana (pt.) | 9 689 | (NA) | 2 456 | (NA) |
| Naranjo zona urbana (pt.) | 1 764 | (NA) | 587 | (NA) | | | | | |
| | | | | | Maunabo Municipio | 6 224 | 2 813 | 1 544 | (NA) |
| San Juan boma | 3 186 | 2 528 | 884 | (NA) | Maunabo boma | 5 383 | (NA) | 1 379 | (NA) |
| | | | | | Ponce zona urbana (pt.) | 1 674 | 562 | 457 | (NA) |
| Oracovis Municipio | 19 332 | 20 201 | 5 235 | 4 340 | Maunabo Urbana boma | 1 674 | (NA) | 457 | (NA) |
| Ala de la Piedra boma | 350 | 554 | 159 | (NA) | Marquez boma | 1 947 | 1 747 | 544 | (NA) |
| Ala de la Piedra boma | 1 491 | 1 325 | 377 | (NA) | Marquez aldea | 2 086 | 724 | 531 | (NA) |
| San Juan aldea | 1 008 | | 223 | (NA) | Marquez aldea | 1 444 | | 146 | (NA) |
| San Juan aldea boma | 1 330 | 1 411 | 372 | (NA) | Monte Llanos boma | 391 | 302 | 143 | (NA) |
| San Juan aldea boma | 474 | 709 | 137 | (NA) | Poya boma | 20 253 | 15 574 | 5 550 | (NA) |
| Sermes boma | 569 | 595 | 165 | (NA) | Ponce zona urbana (pt.) | 20 253 | (NA) | 5 550 | (NA) |
| San Juan boma | 3 394 | 2 999 | 905 | (NA) | | | | | |
| San Juan boma | 485 | 839 | 177 | (NA) | Portugues boma | 3 145 | 1 559 | 779 | (NA) |
| San Juan boma | 58 | 110 | 31 | (NA) | Ponce zona urbana (pt.) | 2 063 | (NA) | 519 | (NA) |
| San Juan aldea boma | 558 | 622 | 133 | (NA) | Portugues Urbana boma | 9 508 | 7 547 | 2 675 | (NA) |
| | | | | | Ponce zona urbana (pt.) | 4 093 | 5 289 | 1 497 | (NA) |
| San Juan aldea boma | 826 | 1 048 | 221 | (NA) | Primera boma | 4 093 | 567 | 272 | (NA) |
| Gato boma | 1 162 | 817 | 372 | (NA) | Ponce zona urbana (pt.) | 356 | 56 | 54 | (NA) |
| María de Canas boma | 584 | 573 | 170 | (NA) | Quebrada Limón boma | 1 247 | 1 533 | 518 | (NA) |
| Oracovis boma | 3 120 | (NA) | 786 | (NA) | Ponce zona urbana (pt.) | 1 247 | (NA) | 518 | (NA) |
| Oracovis pueblo | 1 256 | (NA) | 374 | (NA) | | | | | |
| Oracovis zona urbana | 1 256 | 3 684 | 139 | (NA) | Real boma | 2 464 | 1 696 | 520 | (NA) |
| Pedro boma | 651 | 799 | 140 | (NA) | Sabanetas boma | 7 655 | 7 558 | 1 946 | (NA) |
| Sabana boma | 528 | 432 | 140 | (NA) | Ponce zona urbana (pt.) | 7 514 | (NA) | 909 | (NA) |
| Santos boma | 2 256 | 2 341 | 577 | (NA) | San Antron boma | 11 219 | 12 980 | 3 363 | (NA) |
| | | | | | San Antron aldea | 11 219 | (NA) | 3 363 | (NA) |
| Patillas Municipio | 17 774 | 17 828 | 5 099 | 4 331 | Ponce zona urbana (pt.) | 115 | 597 | 34 | (NA) |
| Acedera boma | 772 | 801 | 225 | (NA) | San Patricia boma | 13 555 | 19 541 | 4 888 | (NA) |
| Bata boma | 1 686 | 1 544 | 499 | (NA) | Segunda boma | 13 555 | (NA) | 4 888 | (NA) |
| Lamboglia aldea | 1 155 | | 313 | (NA) | Ponce zona urbana (pt.) | 7 395 | 10 672 | 2 652 | (NA) |
| Cacao Alto boma | 1 252 | (NA) | 381 | (NA) | Sexta boma | 7 395 | (NA) | 2 652 | (NA) |
| Patillas zona urbana (pt.) | 327 | (NA) | 108 | (NA) | Ponce zona urbana (pt.) | | | | |
| Cacao Bajo boma | 1 718 | (NA) | 459 | (NA) | | | | | |
| Palmas aldea (pt.) | 307 | 350 | 54 | (NA) | Tercera boma | 1 096 | 1 338 | 355 | (NA) |
| Patillas zona urbana (pt.) | 195 | (NA) | 41 | (NA) | Ponce zona urbana (pt.) | 1 096 | (NA) | 355 | (NA) |
| Patillas zona urbana (pt.) | 141 | 80 | 30 | (NA) | Tibes boma | 1 437 | 1 275 | 400 | (NA) |
| Guardarraya boma | 1 709 | 1 660 | 549 | (NA) | Vayas boma | 1 460 | 1 375 | 374 | (NA) |
| Reca aldea (pt.) | 789 | | 236 | (NA) | Ponce zona urbana (pt.) | 1 460 | (NA) | 45 | (NA) |
| | | | | | | | | | |
| Jacabo boma | 1 078 | 1 454 | 305 | (NA) | | | | | |
| Reca aldea (pt.) | 366 | | 103 | (NA) | | | | | |
| Jagui boma | 349 | 501 | 109 | (NA) | | | | | |

* Population centers within 4 mi. of Ponce.